



# Chapter 5 Cumulative Effects

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## 5.0 CUMULATIVE EFFECTS

### 5.1 Context for Analysis

The National Environmental Policy Act (NEPA) defines cumulative effects as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 CFR 1508.7). Section 3.0, Affected Environment, described the current status of each resource, which reflects the effects of past and current actions. Section 4.0, Environmental Consequences, evaluated the effects of the Makah Tribe’s proposed hunt and the alternative actions on the current status of each resource. This section now considers the cumulative effects of each alternative on each resource, in the context of the effects of past actions, current conditions, and reasonably foreseeable future actions and conditions.

The Olympic coast is sparsely populated, with almost the entire coastline being undeveloped (Section 3.1.1.1, Olympic Coast National Marine Sanctuary). Most of the project area lies within the Olympic Coast National Marine Sanctuary, and most of the coast is either wilderness (part of the Olympic National Park) or tribal land (Figure 1-1). The only projected development in the area of which NMFS is aware is the Makah Bay Wave Energy Pilot Project (Section 3.4.3.6.10, Marine Energy Projects). The project has been licensed to operate for five years (FERC 2007a), and will involve four buoys deployed about 3.7 miles from shore in the Makah U&A. Each buoy will be tethered by a cable to four surface floats (approximately 4 feet in diameter) and each float will be connected by a cable to a subsurface anchor buoy just above the seafloor. All cables in the anchoring system will be under tension. A transmission cable will connect the buoys to a transmission station on land. This cable will lie along the ocean floor until it reaches a depth that is 10 to 30 feet below mean lower low tide, at which point it will be placed underground until it reaches the station. At this time the applicant has no definitive plans for future expansion of the project (AquaEnergy 2006). It is conceivable that expansion will be proposed in the future. In that event, the applicant “would initiate a new round of acquiring necessary permits or amendments and would engage in additional environmental review” (AquaEnergy 2006). Prior to issuing the license for the project, FERC issued an Environmental Assessment (EA), which examined its potential environmental consequences (FERC 2007b). The following discussion draws on this document.

1 The other future activity with the potential to affect some of the resources project area is the  
2 projected growth of shipping into Puget Sound, which will increase the number of container ships  
3 traversing the Strait of Juan de Fuca. Approximately 4,500 vessels annually traversed the Strait of  
4 Juan de Fuca during 2002 through 2004 (Table 3-40). The Washington Ports Association projects  
5 a 4 percent annual growth rate of container shipping into Puget Sound through 2025. Container  
6 ships in the Strait are controlled by the Coast Guard's vessel separation scheme (3.6.3.1.4,  
7 Commercial Shipping). Alternative 6 would allow the Makah Tribe to hunt in the entire Makah  
8 U&A, including the Strait of Juan de Fuca, year-round. Vessel activity associated with hunting  
9 would therefore be added to a volume of vessel traffic that is projected to increase in the future.

10 In addition to future actions in the project area, future actions along the entire coast have the  
11 potential to affect gray whales because of their migration patterns. Projections for the future of  
12 shipping coastwide are uncertain due to concerns about fuel prices and the capacity of west coast  
13 ports to accommodate increased volumes (White 2008). There are several proposals by various  
14 entities to develop ocean energy projects all along the Pacific coast (Section 3.4.3.6.10, Marine  
15 Energy Projects). At this time these projects are in the preliminary stages of study and design, and  
16 it is difficult to predict how many will ultimately be deployed and in what configuration.  
17 Consequently, an analysis of the impact of the action alternatives on gray whales or other  
18 wildlife, when added to the effects of future ocean energy projects, would be speculative, or not  
19 possible without project details available to analyze.

## 20 **5.2 Water Quality**

21 As described in Section 3.2.3, Water Quality, Existing Conditions, Ecology has not listed any of  
22 the waters in the project area as impaired (in other words, no past or current actions are negatively  
23 affecting the quality of waters in the project area to the point that they are impaired). None of the  
24 alternatives would have more than a negligible impact on water quality. The EA for the Makah  
25 Bay wave energy project concluded that it would have only localized and short-term impacts on  
26 water resources (FERC 2007b). Increased vessel traffic could increase the risk of oil spills in the  
27 Strait. It is likely, however, that the amount of oil from a potential spill associated with a gray  
28 whale hunt would be small because of the size of vessels involved, and would quickly disperse  
29 (Section 4.2.3.2-4.2.3.6, Water Quality, Alternatives 2-6). Compared to the volume of oil  
30 associated with an oil spill from a cargo vessel, the volume of oil potentially spilled during a  
31 Makah gray whale hunt in the Strait of Juan de Fuca under Alternative 6 would represent a minor

1 contribution to the overall risk in the Strait. For these reasons, no cumulative effects are  
2 anticipated on water quality.

### 3 **5.3 Marine Habitat and Species**

4 As described in Section 3.1.1.1.2, Designation and Regulatory Overview, the marine and coastal  
5 environment of the northern Washington coast is a highly productive and nearly pristine. As  
6 described in Section 3.3.3, Marine Habitat and Species, Existing Conditions, the marine habitat  
7 and species in the project area are shaped by large-scale physical processes that would not be  
8 affected by any hunting or associated activities under any of the alternatives. In addition, hunting  
9 activities under any of the alternatives would have only minor short-term localized impacts on the  
10 marine habitat or species in the project area. The EA for the Makah Bay wave energy project  
11 examined potential impacts on fish, invertebrates, and marine vegetation in the project area. It  
12 concluded that no fish or invertebrates were likely to be entrapped in the buoys; installation of the  
13 project would result in a temporary localized disturbance of fish and invertebrates; the small  
14 footprint of the mooring buoys and the placement of the transmission cable on silt and sand  
15 (rather than rocky areas) would result in little or no disturbance of fish species, invertebrates, and  
16 marine vegetation; and the underground placement of the transmission cable in the nearshore area  
17 would limit disturbance of the nearshore benthic environment (FERC 2007b).

18 The FERC EA includes a variety of protective measures to reduce any potential impacts to  
19 marine habitats and species, including: developing a fuel and oil spill control, prevention, and  
20 countermeasures plan; developing and implementing a plan to conduct a baseline and post-  
21 installation hard substrate benthic community survey along the proposed submarine transmission  
22 line route; removing existing marine debris and derelict fishing gear from the immediate project  
23 area prior to project construction and installation. The minimal effect on marine habitat and  
24 species from any of the alternatives examined in this analysis, combined with minimal effects  
25 from the Makah Bay wave energy project, are unlikely to have cumulative effects on marine  
26 habitat and species.

### 27 **5.4 Eastern North Pacific Gray Whale**

28 Section 3.4.3, Eastern North Pacific Gray Whale, Existing Conditions, describes the life history  
29 and current status of ENP gray whales. The ENP stock of gray whales is recognized by the  
30 International Whaling Commission (IWC) and NMFS as a single stock without subpopulations or  
31 management units. It also describes the dynamic use of the southern portion of the whales'

1 summer range by individual whales, some of which return to areas within this southern portion in  
2 multiple years. Section 4.4, Environmental Consequences, Eastern North Pacific Gray Whales,  
3 considers the potential impacts of the six alternatives on the ENP gray whale stock as a whole,  
4 gray whales in local survey areas, and individual gray whales.

5 For the ENP gray whale stock as a whole, past over-harvesting led to its depletion and listing in  
6 the United States as an endangered species. With the moratorium on commercial harvest, the  
7 stock recovered to the point where it was de-listed. NMFS considers the stock to currently be at  
8 or near its carrying capacity and so within its OSP. NMFS estimates the ENP gray whale stock  
9 can sustain the harvest of 417 whales per year and still remain within its optimum sustainable  
10 population (OSP) level. All six alternatives are likely to have the same effect on the ENP gray  
11 whale stock as a whole, which is a removal of an average of 124 whales per year (zero to five  
12 whales killed by Makah hunters with the remainder harvested in the Chukotkan hunt). This level  
13 of mortality would be added to other sources of mortality that include whales that are killed by  
14 ship strike, whales that are killed incidental to fishing operations, and whales that are struck and  
15 lost and may die as a result of their injuries.

16 Angliss and Outlaw (2008) estimate that about seven whales die annually in United States  
17 commercial fisheries, and one dies annually from ship strike. Data regarding gray whale  
18 mortalities in Canadian fisheries are not readily available. However, they are thought to be small  
19 and the large stock size and rate of increase over the past 20 years makes it unlikely that  
20 unreported mortalities from those fisheries would be a significant source of mortality for this  
21 stock (Angliss and Outlaw 2008). The number of whales struck and lost in the Chukotka hunt has  
22 varied annually, with nine reported in 2005 as the highest recent reported number. Assuming all  
23 struck and lost whales die, the number of whales potentially lost from all sources of human-  
24 caused mortality would be approximately 141. That number is only one-third of the calculated  
25 PBR for the ENP gray whale stock. The cumulative effects of human-caused mortality would not  
26 affect the ability of the ENP gray whale stock as a whole to be maintained at its OSP level.

27 In the future, the ENP gray whale stock as a whole, and particularly gray whales in the Strait of  
28 Juan de Fuca portion of the Makah Tribe's U&A, may be affected by the projected increases in  
29 shipping through the Strait. Given the small number of gray whales estimated to be killed by ship  
30 strike throughout their entire range, as described above, it is unlikely there would be more than a  
31 minor increase in the risk of ship strike in the Strait in the future. Therefore, under Alternative 6

1 (which allows hunting in the Strait), only minor cumulative impacts to gray whales in the Strait of  
2 Juan de Fuca would be expected as a result of increased shipping.

3 Another future development with the potential to affect the ENP gray whale stock as a whole, and  
4 particularly gray whales in the Makah U&A, is the proposed wave energy projects described in  
5 Section 3.4.3.6.10, Marine Energy Projects. These projects have the potential to result in serious  
6 injury or death of migrating or summer-feeding whales. Before any of these projects are licensed,  
7 they must undergo a permitting process that would consider their effects on ENP gray whales (as  
8 was done with the permit issued for the pilot project in Makah Bay).

9 As analyzed in FERC's EA (FERC 2007b), the Makah Bay wave energy project would pose only  
10 minor or localized risks to gray whales. Identified potential risks to marine mammals include  
11 noise effects, disturbance from or collisions with construction and maintenance vessels,  
12 electromagnetic fields effects on marine behavior and migration, collision with mooring and  
13 anchor lines/cables, and entanglement with the buoy mooring system and transmission cable. The  
14 likelihood of a ship strike with marine mammals is considered low because of the small amount  
15 of vessel traffic and slow speeds that would occur during construction, (FERC 2007b). Because  
16 of the small area occupied by the project relative to vastness of the open ocean, the potential for  
17 marine mammals to encounter the buoy array is also considered small. Similarly, entanglement is  
18 also deemed unlikely because cable tension should avoid forming loops, and cable spacing is  
19 wide enough apart for animals to pass through. Disturbance from noise (primarily vessel traffic  
20 during construction) is expected to be minimal and short term, and will likely be dampened by the  
21 effect of surf and substrate. In addition, the FERC EA (FERC 2007b) includes a variety of  
22 protective measures to reduce potential impacts to marine mammals, including: using observers  
23 during cable laying activities, biannual anchor inspections, keeping a standby vessel to assist  
24 entangled animals, and monitoring for entanglement, collisions, and cetacean acoustics.  
25 Therefore, no cumulative effects to gray whales are anticipated as a result of the Makah Bay  
26 wave energy project, when combined with effects under any of the alternatives considered here.  
27 Several additional ocean energy projects are proposed along the gray whales' migration route  
28 (Section 3.4.3.6.10, Marine Energy Projects), which if developed could affect migrating gray  
29 whales. At this time it is unknown whether or how such projects might be deployed. Thus,  
30 although ocean energy projects arrayed along the west coast could negatively affect the  
31 abundance of the gray whale population as a whole, there is insufficient information at this time  
32 to evaluate potential cumulative effects. The Scientific Committee of the IWC annually monitors  
33 the status of ENP gray whales. In the event that gray whale abundance declines as a result of the

development of ocean energy projects (or any other future developments), the IWC has a process in place to adjust catch limits every five years for aboriginal subsistence hunting (Section 1.2.4.1.3, IWC Aboriginal Subsistence Whaling).

Ocean energy projects could have a greater impact on summer-feeding whales in the PCFA survey areas than on the ENP gray whale stock as a whole because the summer-feeding whales spend more time along the west coast. If ocean energy projects negatively affect the abundance of gray whales identified in the ORSVI survey area, under Alternative 2 the number of identified whales that can be harvested would be reduced accordingly. Under Alternatives 3, 5, and 6, which do not include provisions for adjusting the numbers of identified whales that can be harvested, it is possible that the abundance of identified whales in the ORSVI would decline as a result of cumulative effects.

Evidence of global climate change in the past few decades has accumulated from a variety of geophysical, biological, oceanographic, and atmospheric sources. The scientific evidence indicates that average air, land, and sea temperatures are increasing at an accelerating rate. Although climate changes have been documented over large areas of the world, the changes are not uniform and affect different areas in different ways and intensities. Arctic regions have experienced some of the largest changes, with major implications for the marine environment as well as for coastal communities (Gitay et al. 2002 for the Intergovernmental Panel on Climate Change [IPCC]; Arctic Climate Impact Assessment 2004; IPCC 2007).

Global climate change may also affect abundance, viability and distribution of the ENP gray whale stock in the future. ENP gray whales feed on a variety of prey, both benthic and pelagic, and will switch feeding areas and strategies in response to changes in prey availability (Section 3.4.3.3, Distribution and Habitat Use). Global climate change may cause diminished prey availability in the northern portion of the summer range, causing more whales to use the southern portion of the summer range (Weiss 2007). At this time it is uncertain how overall gray whale abundance and viability will be affected by global climate change (Weiss 2007). As described above, the Scientific Committee of the IWC annually monitors the status of the ENP gray whale stock, and the IWC has a process to adjust catch limits.

For gray whales in local survey areas, there are no other cumulative effects that are unique from those that affect the gray whale stock as a whole. Although the whales' migratory corridor is also a major shipping route, there is no evidence that disturbance from shipping has prevented the whales' use of local survey areas both during the migration periods and the summer feeding

1 period. The estimated number of whale mortalities per year from ship strikes is low (one to two),  
2 with an unknown number of those mortalities being whales identified in local survey areas. There  
3 is no evidence that this level of mortality is affecting the ENP gray whales' use of the local  
4 survey areas. There is some whale-watching that occurs in the local survey areas, but no evidence  
5 that this activity results in more than a minor temporary disturbance. Adding the potential  
6 disturbance and mortalities associated with a gray whale hunt under Alternatives 2 through 6 to  
7 these existing levels of disturbance and mortality would not be expected to have effects on gray  
8 whales in local survey areas and individual gray whales beyond those already analyzed in Section  
9 4.4.3, Eastern North Pacific Gray Whale, Evaluation of Alternatives.

10 For individual whales, it is possible that the stress associated with hunting, when added to  
11 existing sources of stress such as those described in Section 3.4.3.6, Known and Potential  
12 Anthropogenic Impacts, could lead to the mortality of some individual whales. This possibility is  
13 explored in Section 4.4.2.1, Change in Abundance and Viability of the ENP Gray Whale Stock.

## 14 **5.5 Other Wildlife Species**

15 Section 4.5.3, Other Wildlife Species, Evaluation of Alternatives, analyzes the effects likely to  
16 occur to other wildlife species from implementation of Alternatives 2 through 6. These effects  
17 would primarily be from vessel noise and disturbance and would be greater under alternatives that  
18 involve the greatest number of days of hunting (Alternatives 3 and 6). Some disturbance would  
19 also be expected from aircraft and gunfire associated with a hunt. Under all alternatives these  
20 effects are expected to be minor and temporary for all species with the possible exception of some  
21 seabird colonies during the nesting season. Section 3.13.3, Transportation, Existing Conditions,  
22 describes existing levels of vessel and air traffic in the project area to which the additional vessel  
23 and air traffic would be added under Alternatives 2 through 6.

24 Future increases in shipping through the Strait of Juan de Fuca have the potential to affect marine  
25 mammals and birds through vessel interactions and noise. Vessel collisions with marine  
26 mammals, though rare, could increase in the Strait as a result of increased shipping. Added to this  
27 increased risk would be the slight increased risk of vessel strike associated with a gray whale hunt  
28 in the Strait under Alternative 6. Increased vessel traffic in the Strait could also affect birds using  
29 the Strait for nesting, foraging and other activities. Under Alternative 6, minor cumulative  
30 impacts on marine mammals and birds are possible as a result of increased shipping.

31 The EA for the Makah Bay wave energy project describes potential impacts to other wildlife  
32 species (FERC 2007b). For marine mammals (including pinnipeds and otters) it concluded there



would be minimal impacts, for the reasons described above under Section 5.4, ENP Gray Whales. For sea birds it concluded that any disturbance would be short term and localized and primarily associated with the construction phase of the project (FERC 2007b). Seabird entanglement in the completed mooring and anchor system is deemed unlikely because of adequate cable burial, tension, and spacing (FERC 2007b). Available information does not suggest that existing levels of disturbance for any species are currently a cause of concern for any species of wildlife in the project area. The minor, short-term localized disturbance from any of the alternatives, combined with the minimal disturbance from the Makah Bay wave energy project, when added to existing levels of disturbance, would not result in cumulative effects to other wildlife species.

## **5.6 Economics**

Section 3.6.3, Economics, Existing Conditions, describes Clallam County's recent drop in unemployment rate (from 6.9 percent in 2000 to 5.6 percent in 2006) and increase in personal income (63 percent increase from 1990 to 2004). Levels of unemployment are higher and personal income lower in Neah Bay compared to county-wide data. There are no foreseeable future trends that may affect the present economic climate in the county or in Neah Bay.

Section 4.6, Environmental Consequences, Economics, analyzes the potential for minor temporary increases or decreases in tourism in Clallam County and Neah Bay if a gray whale hunt is authorized under Alternatives 2 through 6. It also describes no likely change in economic conditions if a gray whale hunt is not authorized under Alternative 1. According to the EA for the Makah Bay wave energy project (FERC 2007b), that project would have a positive effect on the economy in the project area. Given the current economic climate and generally favorable economic trends in Clallam County, and that the potential effects of any of the alternatives are either nonexistent or minor and temporary, no cumulative effects are anticipated on the local economy.

## **5.7 Environmental Justice**

Section 4.7, Environmental Justice, describes the potential effects on the Makah Tribe (the population of concern for purposes of considering Executive Order 12898, *Environmental Justice*) of the No-action Alternative and the five action alternatives. Because the Makah Tribe has requested authorization of a whale hunt, impacts to the Tribe under the action alternatives are not an issue of concern under the Executive Order. Under the No-action Alternative, it is possible the Makah Tribe would experience cumulative effects, for the reasons described under 5.10, Subsistence and Ceremonial Resources.

## **5.8 Social Environment**

As described in Section 3.8, Social Environment, Existing Conditions, various groups and individuals have different opinions about hunting whales. NMFS received public comments about the hunt from a broad geographic area; public scoping occurred in the vicinity of the project area as well as in Washington D.C. Makah Tribe members and other tribes generally support the hunt, while the general public has mixed feelings about the issue. Section 4.8, Environmental Consequences, Social Environment, analyzes the potential for these different groups to experience both increased social conflict and increased social bonding, within the groups and outside the groups, under any of the alternatives. Other social issues exist that may have caused conflict or bonding within or among these groups in the past, and new issues are likely to arise in the future. It is too speculative to consider whether the issue of Makah gray whale hunting would result in substantial cumulative effects within this larger social context.

## **5.9 Cultural Resources**

As analyzed in Section 4.9, Environmental Consequences, Cultural Resources, no adverse effects are expected to cultural resources if hunting is authorized under Alternatives 2 through 6. Some beneficial effects are possible to both listed and unlisted cultural sites historically used for whaling-related ceremonies if hunting is authorized. These sites are also used for other non-whaling activities. No cumulative effects are expected beyond those considered in Section 4.9 since no effects would occur to sites outside of the project area.

## **5.10 Subsistence and Ceremonial Resources**

Section 3.10.3, Ceremonial and Subsistence Resources, Existing Conditions, describes the past and current status of Makah subsistence and ceremonial practices, including a history of such practices being discouraged by United States government policy and a recent resurgence in such practices. It also describes the prestige accorded whaling families in traditional Makah society. Section 4.9, Environmental Consequences, Cultural Resources, examines the potential for resumption of whaling under Alternatives 2 through 6 to enhance the Tribe's subsistence and ceremonial practices and, conversely, for implementation of Alternative 1 (no authorized hunting) to detract from these practices. Future policies of the United States Government are difficult to predict, as are future trends in the values of the dominant culture that may affect Makah ceremonial and subsistence practices. It is also not possible to predict the availability of subsistence resources in the future, although it is likely that resources will shift as global climate change affects the ocean ecosystem. It is possible that a denial of the Tribe's request under

Alternative 1, when added to the legacy of United States Government policies discouraging subsistence and ceremonial practices, would have negative cumulative effects.

### **5.11 Aesthetics**

Under Alternatives 2 through 6 there may be some temporary aesthetic effects to those viewing gray whale hunts through the media or from local vantage points both inside and outside of the project area. There are currently no issues identified in the project area related to aesthetics, and those outside of the project area were addressed as a direct or indirect affect from media coverage or vantage points. No cumulative effects would therefore be expected beyond the effects of alternatives analyzed in Section 4.12.3, Aesthetics, Evaluation of Alternatives.

### **5.12 Transportation**

Under Alternatives 2 through 6 there may be some localized, temporary effects on highway traffic in the project area, but no transportation effects would occur outside of the project area. Marine and air traffic effects outside of the project area were also analyzed in Chapter 4. The Makah Bay wave energy project is not likely to have effects on transportation in the project area (FERC 2007b). If the project were expanded in the future, there could be effects, which would be analyzed under NEPA. No cumulative effects would therefore be expected beyond the effects of the alternatives analyzed in Section 4.13.3, Transportation, Evaluation of Alternatives.

### **5.13 Public Services and Public Safety**

Under Alternatives 2 through 6 there may be some localized, temporary effects on police services in the project area, but no strains are anticipated on medical services in either the project area or on medical services in larger cities outside of the project area. It is not anticipated that localized needs for police services under any of the action alternatives would require additional services from law enforcement sources outside of the project area analyzed in Chapter 4. No cumulative effects would therefore be expected beyond the effects of the alternatives analyzed in Section 4.14.3, Public Services, Evaluation of Alternatives, or Section 4.15.3, Public Safety, Evaluation of Alternatives.

### **5.14 Public Safety**

This resource area is considered above.

## **5.15 Human Health**

Section 3.16.3, Human Health, Existing Conditions, describes the levels of contamination found in gray whales and the potential for food-borne pathogens associated with the butchering, storage and preparation of gray whale products. It also describes the nutritional benefits of gray whale food products. As discussed in Section 4.16.3, Human Health, Evaluation of Alternatives, the contaminant level in the current diet of Makah Tribe members is unknown, and it is not possible to evaluate the change in Tribal members' exposure to contaminants or pathogens, or in their nutrition, without knowing how much or what type of whale products individuals would consume and without knowing the contaminant level and nutritional composition of their present diet.

Furthermore, it is not possible to determine how past events such as a moratorium on whaling affected the overall health of the Makah Tribe since no data exist to demonstrate changes in health before and after whale hunting was allowed. Additionally, there would be no cumulative effect resulting from consumption of whale products beyond that analyzed for the Makah tribal members in Chapter 4 since no other communities would be exposed to whale products under any alternative.

## **5.16 National and International Regulatory Environment**

As described in Section 4.17.3, National and International Regulatory Environment, Evaluation of Alternatives, it is too speculative to conclude that NMFS' decision to authorize or not authorize a whale hunt would affect marine mammals in the United States, whaling worldwide, or indigenous people worldwide. It is therefore too speculative to conclude that there would be any cumulative effects on these resources associated with a NMFS decision under any of the alternatives.